Using RAD Vmux voice trunking over BGAN

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Overview

The RAD Vmux voice trunking solution significantly reduces (by up to 16:1) the amount of bandwidth required for telephony services, at the same time as maintaining toll quality, and without affecting existing features such as fax, modem, IVR, voice mail, etc.
The unique RAD Vmux voice trunking gateway family is specially designed to allow the Oil and Gas, Maritime, Broadcasting, Disaster Recovery and Military markets to increase the amount of calls that can be transferred on limited satellite bandwidth, whilst leaving more bandwidth available for data. When you pick up a phone connected to Vmux and BGAN from anywhere in the world, it's the same as picking up a desk phone in your office.

Product range

The complete Vmux voice trunking solution is comprised of the following:

- **Vmux-2100**
  The Vmux-2100 voice trunking gateway provides compressed voice transmission over both TDM and IP based networks. Employing powerful voice compression algorithms as well as TDMoIP technology, the Vmux-2100 can compress up to 16 full E1/T1 circuits over a single E1/T1, serial or packet-based network.
- **Vmux-110**
  The Vmux-110 remote site voice trunking gateway provides LAN and compressed voice transmission over both TDM and IP based networks. Employing powerful voice compression algorithms as well as TDMoIP technology, the Vmux-110 can compress a full E1/T1 or 4 or 8 analog lines, leaving more bandwidth for data transport.
- **Vmux-210**
  The Vmux-210 analog voice trunking gateway is a remote compressed voice channel bank, providing LAN and compressed voice transmission over both TDM and IP based networks. Employing powerful voice compression algorithms as well as TDMoIP technology, the Vmux-210 can compress up to 30 analog lines (see test results below for figures obtained), connected to phones or faxes, leaving more bandwidth for data transport.

Typical Users

- Oil and Gas platforms.
- Shipping fleets.
- International construction/manufacturing/mining companies.
- Disaster recovery organizations.
- Broadcasting networks.
- Military (Army, Navy and Air force).

Key Features

RAD Vmux voice trunking offers the following main features over the BGAN network:

- Reduced bandwidth requirements for voice transmission (by up to 16 to 1), while maintaining toll quality.
- VAD and silence suppression ensures minimal bandwidth utilization when no calls are active.
- Support for a variety of digital or analog voice interfaces for connection to PBXs, phones, faxes, key-systems and 2-way radio systems.
- Equipped with E1/T1, Serial and IP network links.
- Transparent to all types of signaling.
- Additional reduction of bandwidth for standard signaling channels such as SS7, PRI, DPNSS, etc.
- Additional ETH port supporting voice/data prioritization.
- Forward Error Correction.
- Fax, Modem & DTMF Relay.
- Built-in echo cancellation.
- AC or DC power supply.
- In band or out of band management for remote device.
- Compact, scalable & simple to deploy.

Benefits to BGAN users

RAD Vmux voice trunking offers you the following main benefits:

- Multi user voice deployments.
- Plugs directly to a BGAN terminal's Ethernet interface.
- Simultaneously transmits voice and data over BGAN networks, while ensuring QoS.
- Simple deployment with no integration costs or retraining of staff.
- Quick payback.

Setting up

In order to ensure quick deployment, and proper functioning of the RAD Vmux voice trunking solution over BGAN, be sure to follow the guidelines in this section.

Equipment Needed:

- Vmux-110/FXO or Vmux-2100/E1 for central site.
- Vmux-110/FXS or Vmux-110/E1 for remote site.
- BGAN terminal.
- Analogue Phones.

Step by Step setup

The steps bellow relate to the analogue voice trunking solution. Setting up the digital solution is similar.

Configuration of RAD Vmux devices can be performed via the supervisory terminal port, using either:

- Standard PC HyperTerminal applications, or
- Telnet/web client via the Ethernet port.

The IP address must be defined through the supervisory terminal.

To set up your computer and BGAN terminal for RAD Vmux:

1. Connect the central site Vmux-110 via FXO interfaces to the PBX or voice switch.
2. Connect the remote site Vmux-110 via FXS interfaces to phones or faxes, and via Ethernet interface to the BGAN terminal.
3. RAD Vmux requires a static IP address to be configured for use on both the network and the terminal. Therefore, you must obtain a static IP address from your service provider.
   If you are using the Hughes 9201, you must configure the Vmux-110 with the static IP address 192.168.128.101 (or another from the same range, if in use).
4. Open UDP input port 2142 to pass voice traffic.

To start a terminal session:

1. Connect a terminal to the CONTROL connector of Vmux-110.
2. Turn on the control terminal PC and set its port parameters to the default communication parameters (One start bit, Eight data bits, One stop bit, No parity, No flow control, VT100 emulation).
3. Power-up the Vmux-110.
4. After the boot sequence (which lasts approximately 50 seconds), press <Enter> several times (the rate is detected automatically).
5. Proceed with the management session

To configure basic parameters:

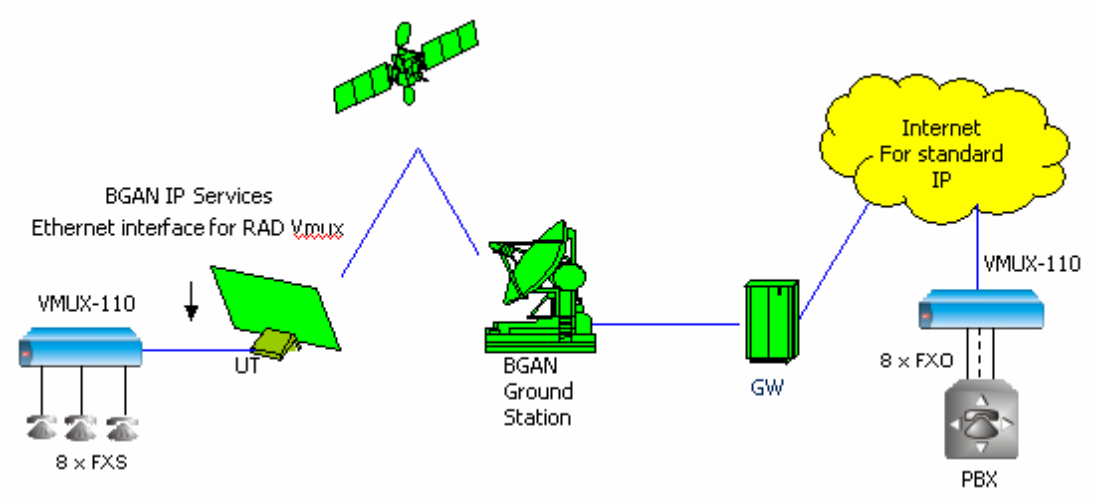
1. From the Main Menu, select **Configuration > Quick Setup**.
2. Configure the desired parameters (see table below):

Parameter	Description	Possible values
Host IP address	Defines Vmux-110's IP address (for both management and voice traffic).	Default: **0.0.0.0**
Host subnet mask	Defines Vmux-110's subnet mask.	Default: **0.0.0.0**
Default gateway	Defines default gateway.	Default: **0.0.0.0**
Destination IP	IP address of the destination Vmux-2100 group or Vmux-110/210.	Default: **0.0.0.0**
Destination bundle	Number of the destination bundle.	**1…30** Default: **1**
Save	Configures a basic voice application in the temporary DB, including a single bundle (according to the specified Destination IP and Destination Bundle); all other parameters retain default values, including the analog ports connected to this bundle Notes: • The Save command erases previously configured bundles (in the event that bundles were configured manually through the Bundles menu). • In addition to selecting Save, you must press @ to save the changes in the database. Otherwise, all changes will be lost.	

3. Select **Save**
4. Bundle connectivity on the Vmux should be configured "without PING" since BGAN in not transparent to ICMP packets. (This should be configured via **Main Menu > Configuration > Bundles > Edit > Connectivity Parameters**)
5. Type **@** and confirm the data base update.

- Vmux does not require any additional external equipment or special configuration to be used over BGAN networks.
- Bandwidth required for the specific voice channels connection can be easily calculated by the Vmux Bandwidth Calculator.
- Maximum Packet size is 1515 bytes (maximum payload is up to 1461 bytes and ETH frame fields require 54 bytes, so in total 1461+54=1515).

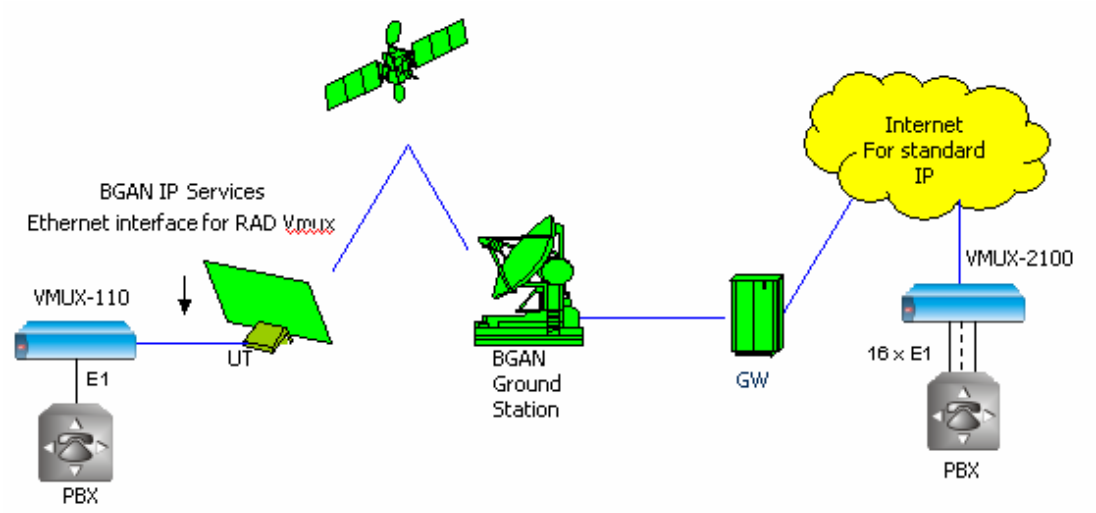
Analogue Compressed Voice Solution Configuration



The above diagram illustrates a compressed voice connection over a BGAN link.

- The Vmux on the user side has IP address 192.168.128.101 and Default Gateway 192.168.128.100 configured (as required by HNS 9201 NAT structure).
- The Vmux on the PBX side has a static IP address and Default Gateway provided by the Network Administrator.
- The bundle (logical channel responsible for compressed voice end-to-end transferring) should be configured with the following destination IP addresses:
  - HNS 9201 network address for PBX side
  - Vmux network address for the user side

Digital Compressed Voice Solution Configuration



- BGAN equipment configuration is the same as for analogue voice transferring.
- Vmux should be configured in accordance with the user equipment requirements.

Hints and tips

- Typical bandwidth requirements:
  - For 4 analog channels ~30 kbps.
  - For 8 analog channels ~50 kbps.
  - For a full E1 ~128 kbps.
- Maximum packet size can be configured on RAD Vmux. The larger the packet size, the better the bandwidth utilization, but also the delay introduced.

Test results

All tests were conducted using the G723.1A/6.4 Kbps codec and the TDMoIP+ function. Tests were conducted directly into PBX and using standard analogue phones lines, both successful.

Test	Results	Notes
Voice calls 32kbps Streaming IP BGAN to LAN	4 calls made simultaneously using ~29kbit/s	Tests conducted on HNS 9201 and 2 VMUX 110 units used - one behind BGAN and second on LAN
Voice calls Standard IP BGAN to LAN	8 calls made simultaneously on Standard IP using ~65kbps	Tests conducted on HNS 9201 and 2 VMUX 110 units used - one behind BGAN and second on LAN
Voice calls made BGAN to E1 terrestrial link	4 calls made simultaneously using BGAN using ~29kbit/s	Tests conducted using Vmux 210 behind BGAN and VMUX 2100/110 with E1 link
E1 disaster recovery using BGAN	4 calls made simultaneously using ~29kbps and 8 calls made using ~65kbps	Allows connecting two voice switches over BGAN. VMUX 2100 behind BGAN and VMUX 110 (E1) in corporate office.

Technical Summary

The technical features of the RAD Vmux voice trunking solution are summarized below:

Feature	Vmux-2100	Vmux-110	Vmux-210
Voice interfaces	Up to 16 E1 or T1	4 or 8 FXS/FXO/E&M 1 E1 or T1	12/15/24/30 FXS
Network interfaces	Ethernet, E1/T1, Serial	Ethernet, E1/T1, Serial	Ethernet, E1/T1, Serial
Voice codecs supported	G.723.1, G.729A, G.711	G.723.1, G.729A, G.711	G.723.1, G.729A, G.711
VAD & Silence suppression	Yes	Yes	Yes
Signaling supported	Any	Any (digital ports) CAS (analogue ports)	CAS only
Ethernet ports	1 for network link	1 for network link + 1 for user side	1 for network link + 1 for user side
Fax/Modem/DTMF Relay	Yes	Yes	Yes
QoS	VLAN or IP TOS	VLAN or IP TOS	VLAN or IP TOS
Echo cancellation	Yes	Yes	Yes
Forward Error Correction	Yes	Yes	Yes
Setup and Control	Supervisory terminal, telnet, web or SNMP	Supervisory terminal, telnet, web or SNMP	Supervisory terminal, telnet, web or SNMP
Dimensions	1U, 19”	1U, 9.5”	1U, 19”

Further details and support

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